Type 122A Three-Way Switching Valve

WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion, fire and/or chemical contamination causing property damage and personal injury or death.

Fisher® switching valves must be installed, operated, and maintained in accordance with federal, state, and local codes, rules and regulations, and Emerson Process Management Regulator Technologies, Inc. (Regulator Technologies) instructions.

If the switching valve vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Installation, operation, and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Only qualified personnel shall install, operate, and maintain the Type 122A three-way switching valve.

W3141-1

Figure 1. *Type 122A Three-Way Switching Valve*

Introduction

Scope of the Manual

This instruction manual includes installation, adjustment, maintenance, and parts ordering information for the Type 122A three-way switching valve.

Description

The Type 122A three-way switching valve (see Figure 1) is a high-capacity, economical three-way pneumatic switching valve for on-off applications. This valve can be used for diverging or converging gaseous service, diverging liquid service with gas-loaded liquids, and converging liquid service. Six spring ranges are available for control pressures from 3 to 150 psig / 0.21 to 10.3 bar.

D100263X012

Specifications

The Specifications section lists the specifications for Type 122A three-way switching valve. Factory specification is stamped on the nameplate fastened on the valve at the factory.

Maximum Inlet Pressure(1)
150 psig / 10.3 bar

Set Pressure Ranges(1)
See Table 1

Maximum Control Pressure to Diaphragm(1)
150 psig / 10.3 bar

Temperature Capabilities(1)
-20 to 150°F / -29 to 66°C

Flow Coefficients
C_g(2)
Connection A to B: 138
Connection A to C: 131

C_1
Connection A to B: 28.0
Connection A to C: 32.5

Control Connection
1/4 NPT

Approximate Weight
5 pounds / 2.3 kg

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.
2. At an inlet pressure of 25 psig / 1.7 bar and with full pressure drop across the body.

Table 1. *Set Pressure Ranges*

SET PRESSURE RANGES		PRESSURE BUILD-UP ABOVE SETPOINT REQUIRED FOR FULL STROKE		SPRING WIRE DIAMETER		SPRING FREE LENGTH		SPRING PART NUMBER	SPRING COLOR
psig	bar	psi	bar	Inches	mm	Inches	mm		
3 to 15	0.21 to 1.0	10	0.69	0.168	4.27	2.94	74.6	1D892327022	Red
5 to 20	0.35 to 1.4	13.5	0.93	0.187	4.75	2.81	71.4	1D751527022	Cadmium
5 to 35	0.35 to 2.4	22	1.5	0.218	5.54	2.50	63.5	1D665927022	Blue
30 to 60	2.1 to 4.1	30	2.1	0.234	5.94	2.57	65.2	1D7455T0012	Green
40 to 100	2.8 to 6.9	54	3.7	0.283	7.19	2.31	58.7	1E543627142	Yellow
60 to 150	4.1 to 10.3	66	4.6	0.240	6.10	2.63	66.8	1P901327142	Brown

Principle of Operation

Refer to Figure 2. The flow through the Type 122A valve is normally from port A to C, with the spring force holding the valve plug down on port B (diverging service).

As the pressure under the diaphragm is increased through port D, it acts against the force of the spring. When the control pressure overcomes the force of the spring, the valve begins to stroke, opening port B. Once the pressure under the diaphragm reaches setpoint plus build-up, the valve completes its stroke and the port C seat ring is closed. The valve will only fully stroke when build-up above setpoint is achieved.

The point at which the valve completes its stroke and the pressure change necessary to do this are dependent on the spring rate and the set point chosen. The set pressure is easily changed by adjusting the screw at the top of the valve.

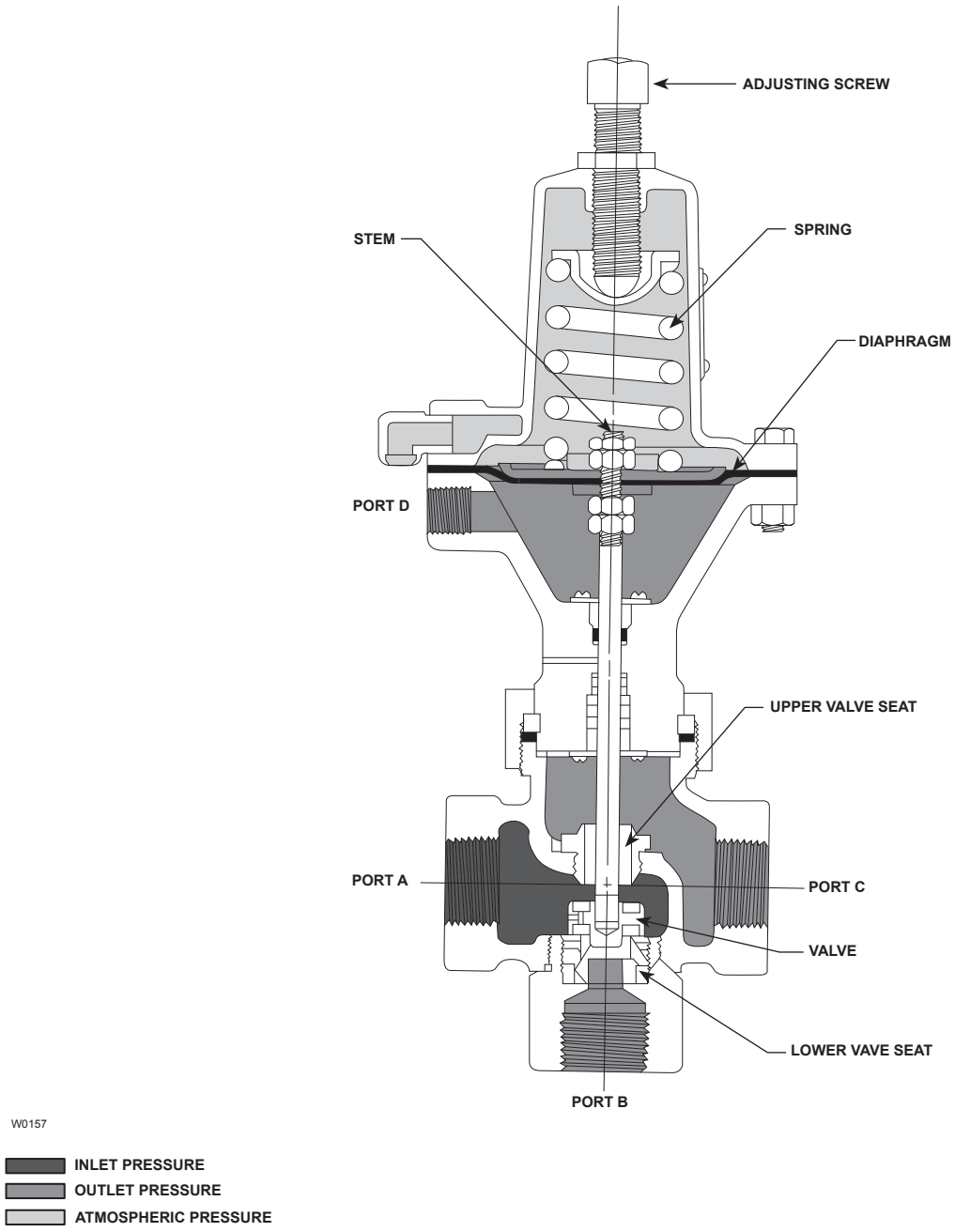

Figure 2. *Type 122A Three-Way Switching Valve Operational Schematic*

Installation

WARNING

To avoid personal injury or equipment damage caused by bursting of pressure-retaining parts or explosion of accumulated gas, do not exceed the pressure or temperature limits in Specifications, and do not use the Type 122A valve for installations where water hammer can be experienced.

1. The switching valve may be installed in any position. Position the vent (key 29, Figure 3) so that the vent opening is facing downward. Protect the vent opening against the entrance of moisture or any other material that could plug the vent.
2. Apply pipe compound to external pipeline threads. Connect piping to the body connections.
3. Connect the control pressure line to the 1/4 NPT connection in the lower diaphragm case.

Overpressure Protection

Type 122A three-way switching valves have maximum outlet pressure ratings that are lower than their maximum inlet pressure ratings. A pressure-relieving or pressure-limiting device is needed if inlet pressure can exceed the maximum outlet pressure rating. Overpressuring any portion of a switching valve or associated equipment may cause leakage, parts damage, or personal injury due to bursting of pressure-containing parts or explosion of accumulated gas. Switching valve operation within ratings does not preclude the possibility of damage from external sources or from debris in the pipeline. A switching valve should be inspected for damage periodically and after any overpressure condition.

Startup and Adjustment

Key numbers is referenced in Figure 3.

1. With proper installation completed and downstream equipment properly adjusted, slowly open the upstream and downstream shutoff valve (when used) while using pressure gauges to monitor pressure.

WARNING

To avoid personal injury, property damage, or equipment damage caused by bursting of pressure containing parts or explosion of accumulated gas, never adjust the control spring to produce an outlet pressure higher than the upper limit of the outlet pressure range for that particular spring. If the desired outlet pressure is not within the range of the control spring, install a spring of the proper range according to the diaphragm parts maintenance procedure.

2. Refer to the nameplate (key 25, Figure 3) for the spring range. To change the spring setting, loosen the locknut (key 30, Figure 3), and rotate the adjusting screw (key 7, Figure 3). Rotating the adjusting screw clockwise into the spring case (key 1, Figure 3) increases the control pressure at which the valve switches. Rotating the adjusting screw counterclockwise decreases the switching pressure.

Maintenance

Parts are subject to normal wear and must be inspected and replaced periodically. The frequency of parts inspection and replacement depends upon the severity of service conditions.

Instructions are given below for complete disassembly and assembly. Disassemble the valve only as far as needed. Then, begin the “Assembly” procedure at the appropriate step.

Key numbers used in these procedures are shown in Figure 3.

WARNING

To avoid personal injury and equipment damage caused by sudden release of process pressure or uncontrolled process fluid, isolate the valve from all pressure, and release all pressure from the valve body and diaphragm casing before attempting maintenance.

Disassembly

1. Loosen the locknut (key 30). Rotate the adjusting screw (key 7) counterclockwise until all compression has been relieved from the spring (key 3).
2. Disconnect piping from the bottom connector (key 36). Unscrew and remove the bottom connector.
3. To remove the lower seat ring (key 37), insert a hexagonal bar into the seat ring hole, and use the bar to unscrew the seat ring. The hexagonal hole in the seat ring is 7/16-inch / 11 mm across the flats.
4. Unscrew and remove the spring case cap screws and nuts (keys 26 and 4). Remove the spring case, upper spring seat, and spring (keys 1, 31, and 3).
5. Unscrew the hex nuts (key 4) from the stem (key 5). Remove the spring guide, diaphragm head, diaphragm, O-ring, back-up ring, and washer (keys 6, 8, 9, 12, 13, and 10).
6. Unscrew the remaining hex nuts from the stem, and pull the disk holder assembly (key 22) and attached stem out through the bottom opening.
7. Remove the disk holder from the stem.
8. Disconnect the control line from the diaphragm case (key 2). Unscrew the union nut (key 19), and remove the diaphragm case, snap ring (key 20), and body gasket (key 21) from the body (key 23).
9. Unscrew the self-tapping screws (key 16) from each end of the diaphragm case. Remove the washers and guide bushings (keys 14 and 15).
10. Remove the O-ring and back-up rings (keys 12 and 13) from the diaphragm end of the diaphragm case, and remove the felt washers, flat washer, O-ring, and back-up rings (keys 18, 17, 12, and 13) from the valve end of the diaphragm casing.
11. Use a thin-wall socket wrench to remove the upper seat ring (key 24).

Assembly

1. Screw the upper seat ring (key 24) into the body (key 23).
2. Install the back-up rings and O-rings (keys 13 and 12) into each end of the diaphragm case (key 2).
3. Install the washer (key 17) and three felt washers (key 18) into the valve end of the diaphragm case. Replace the guide bushings (key 15) in each end of the diaphragm casing. Carefully insert the stem (key 5) through the diaphragm casing to be sure the parts are aligned. Attach the washers (key 14) with self-tapping screws (key 16). Remove the stem.
4. Replace the body gasket and snap ring (keys 21 and 20). Secure the diaphragm case to the body with the union nut (key 19).
5. Coat the threads on the valve end of the stem with high strength threadlocker. Attach the disk holder assembly (key 22) to the stem. Carefully install the stem through the opening of the body.
6. Screw two hex lock nuts onto the stem. Install the back-up ring, washer, O-ring, diaphragm, diaphragm head, and spring guide (keys 13, 10, 12, 9, 8, and 6). Secure with two hex lock nuts (key 4).
7. Set the spring and spring seat (keys 3 and 31) onto the spring guide. Attach the spring case with cap screws in a crisscross pattern.
8. Screw the lower seat ring (key 37) into the bottom connector (key 36). Install the bottom connector into the body.
9. Re-connect piping to the bottom connector and to the control connection in the diaphragm casing.
10. Adjust the spring by following the “Adjustment” instructions.

Parts Ordering

When corresponding with your local Sales Office about this valve, mention the serial number and all other data stamped on the nameplate. When ordering replacement parts, also state the complete 11-character part number of each part required as found in the following parts list.

Parts List

Key	Description	Part Number
1	Spring Case, Aluminum	2P901508012
2	Lower Diaphragm Case, Cast iron	2L918419012
3	Spring	See Table 1
4	Hex Nut, Plated steel (12 required)	1A3915X0022
5*	Stem, 316 Stainless steel	1R177435162
6	Spring Guide, Plated steel	1D666625072
7	Adjusting Screw, Plated steel	1D995448702
8	Diaphragm Plate, Plated steel	1D666428982
9*	Diaphragm, Neoprene (CR)	1D666302102
10	Washer, Plated steel	1D716228982
12*	O-Ring, Nitrile (NBR) (3 required)	1E472706992
13*	Back-up Ring, Leather (5 required)	14B0155X012
14	Retaining Washer, Stainless steel (2 required)	1K786935022
15*	Guide Bushing, Iron (2 required)	1K787021052
16	Self-Tapping Screw, Plated steel (4 required)	1J336928982
17	Washer, Stainless steel	1K787135022
18*	Washer, Neoprene (CR)/Felt (3 required)	1K787206992
19	Union Nut, Ductile iron	1E471119062
20	Snap Ring, Plated steel	1A832648722
21	Body Gasket, Asbestos	1A832504032
22*	Disk Holder Assembly	
	Aluminum/Nitrile (NBR)	1R1772000A2
	Stainless steel/Nitrile (NBR)	1R1772X00A2
	Stainless steel/Fluorocarbon (FKM)	1R1772X0032
23	Body, Cast iron	
	3/4 NPT	1D3124X0022
	1 NPT	1D3125X0022
	WCC Steel	
	3/4 NPT	1E162622012
	1 NPT	1K886222012
24*	Upper Valve Seat	
	Aluminum	1B810309012
	Stainless steel	1B8103X0012
25	Name Plate	----------
26	Cap Screw, Plated steel (8 required)	1B720924052
28	Drive Screw, Plated steel (4 required)	1E501728982
29	Vent Assembly	EMY602X1-A12
30	Locknut, Zinc-plated steel	1D667728982
31	Upper Spring Seat, Plated steel	1D667125072
36	Bottom Flange, Plated steel	1R177524092
37*	Lower Valve Seat	
	Aluminum	1R177309012
	Stainless steel	1R1773X00A2
	WCC Steel	
	3/4 NPT	1E162622012
	1 NPT	1K886222012

*Recommended spare parts

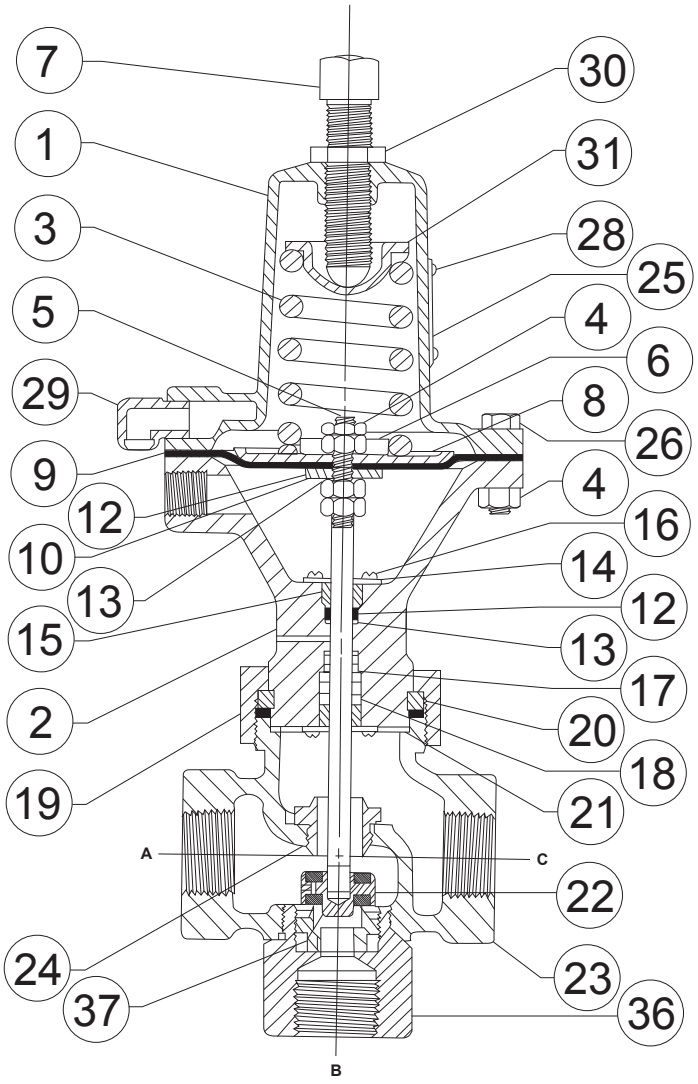

Figure 3. *Type 122A Three-Way Switching Valve Assembly*

Industrial Regulators

Emerson Process Management
Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75069-1872, USA
Tel: +1 800 558 5853
Outside U.S. +1 972 548 3574

Asia-Pacific
Shanghai 201206, China
Tel: +86 21 2892 9000

Europe
Bologna 40013, Italy
Tel: +39 051 419 0611

Middle East and Africa
Dubai, United Arab Emirates
Tel: +971 4811 8100

Natural Gas Technologies

Emerson Process Management
Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75069-1872, USA
Tel: +1 800 558 5853
Outside U.S. +1 972 548 3574

Asia-Pacific
Singapore 128461, Singapore
Tel: +65 6770 8337

Europe
Bologna 40013, Italy
Tel: +39 051 419 0611
Chartres 28008, France
Tel: +33 2 37 33 47 00

TESCOM

Emerson Process Management
Tescom Corporation

USA - Headquarters
Elk River, Minnesota 55330-2445, USA
Tels: +1 763 241 3238
+1 800 447 1250

Europe
Selmsdorf 23923, Germany
Tel: +49 38823 31 287

Asia-Pacific
Shanghai 201206, China
Tel: +86 21 2892 9499

For further information visit www.fisherregulators.com

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